AD / Instrumentation Status Mtg.  
November 6, 2018

We discussed the status of the many projects that we are working on.

The text below can be expanded or collapsed at the date headings.

## Linac Toroid Firmware Update and Maintenance

### Oct. 30, 2018

Dallas reported that the Linac Toroid system had two digitizer channels, 4 and 8, that were not reading back.

### Nov. 6, 2018

Aisha and Dallas will be installing a new digitizer for the Linac Toroids. There is an issue with the timing when they shorten the number of Booster turns being delivered by the Linac. The problem needs to be reasoned through.

## NUMI Toroid Calibration / Re-scaling

### Oct. 30, 2018

Dallas reported that we are still waiting for access to make the modifications that extend the high end of the measurement range of the E:TOR101 and E:TORTGT devices.

Michelle A Ibrahim

Tue 10/23, 12:33 PM

Back in 2012, the integrators for the mi/rr abort and ring toroids were modified to a full-scale of 6E13; however, somehow the numi toroids were missed.

We found a couple spares this morning and can have them ready in a week. We would probably need at a least 4hrs (though 6-8hrs would be preferred) of no beam to swap the modules and do a calibration. E:TOR101 is instrumented in MI60N and E:TORTGT is at U65.  I will put a worklist entry today, but the job could be put off until we reach higher intensity.

In addition, I would strongly urge moving the NUMI toroid to the newer VME system, which all of MI/RR and MB are using. If desired (and space permitting), we can also run the VME system in parallel with the old MADC readouts.

Philip Schlabach

Tue 10/30, 1:30 PM

For now, I have configured the ~~target profile monitor~~ (E:TORTGT?) for the NUMI beam   
permit protection in place of the 101 toroid. It allows a limit of   
54e12. We only need one or the other for protection and there is no   
reason to prefer one over the other. Phil

### Nov. 6, 2018

This calibration of the NUMI toroids is expected to be done tomorrow, Wednesday, Nov. 7th.

## PIP2IT ACCT and DCCT New Installation.

### Oct. 30, 2018

Dallas reported that they are waiting for some cable pulls. I believe ACCT and or DCCT devices are being purchased(?).

### Nov. 6, 2018

No change

## MI / RR DCCT Update Obsolete Chassis.

### Oct. 30, 2018

This job is in progress. The requisition for PCBs for the transition modules has just gone out.

### Nov. 6, 2018

Work in progress. Actually ICs on the transition modules are obsolete so a replacement is being fabricated.

## Delivery Ring RFKO Slow Extraction

### Oct. 30, 2018

There was recently a Construction Readiness Review. The reviewers asked about the fiber optic cable that will be used for transmitting data. This cable will be run through beam enclosures and will be subjected to radiation. Peter said that they expect to use a rad-hard multimode fiber. Some have suggested using a cable used by CERN. They will be deciding on the cable soon.

### Nov. 6, 2018

No change

## Muon Toroid Upgrade

### Oct. 30, 2018

Dallas and Aisha may be meeting with Muon to discuss this upgrade soon.

### Nov. 6, 2018

Dallas and Aisha met with Dave Peterson to discuss upgrading the older toroid electronics in Muon. Aisha reported that our green integrator modules are much like these old electronics they want to replace. Once funding is available, they can start installing the newer electronics.

## Current Booster Damper Operation

### Oct. 30, 2018

Nathan was not available to report on this.

### Nov. 6, 2018

Dampers are working, but Booster believes they were working better before the shutdown. The mode 2 damper has been turned off until more analysis can be made as to how the curves are setup.

## PIP2IT BPM Electronics Upgrade

### Oct. 30, 2018

John Van Bogaert reported that the PIP2IT BPM system is expected to inherit transition boards from FAST and FAST will be making new ones. They are currently procuring 5 prototype transition boards.

Parts are being bought for 35 new 250MHz digitizers using a combination of Booster and PIP-II money. John also warned that distributors have long lead-times on many discrete components like capacitors. If you are needing these components for a project you should check the lead-times early.

### Nov. 6, 2018

No change

## PIP2IT BPM Linux Upgrade

### Oct. 30, 2018

We will need to procure more processors. This is waiting on PIP-II money. To develop the code, they will need specifications regarding the firmware on the digitizers and soon after some digitizers running the firmware to develop/test the new code.

### Nov. 6, 2018

No change

## IOTA BPM Operation

### Oct. 30, 2018

Brian Fellenz reported that they will need new transition boards next year when they expect to switch from accelerating electrons to accelerating protons. This will be a new transition board circuit for which they do not have all the information for yet. We should discuss with Jerry Leibfritz whether they have money in their project for these.

### Nov. 6, 2018

Nathan reported that IOTA was previously only measuring the injected beam, but now need beam position measurements for the orbit and kicked beam. He estimated a week of work to start getting these measurements. They currently have new firmware and they need to get the new FE software to go with this.

## Booster BPM Upgrade

### Oct. 30, 2018

Many things have been fixed. There is currently a data collection problem where data collection will fail between 1 minute to 30 minutes after starting. Peter mentioned an issue related to when they give an enable to acquire the data.

Peter believes the problems with the Timing Cards have been solved.

The port of the Linux Front-End to the 8100s is completed and John Diamond is happy with the way it has been working. All the BPM houses in booster are using the 8100s now. They have reclaimed all the x86 nodes.

### Nov. 6, 2018

Peter reported that the previous data collection failures have been cleared up. Now they are troubleshooting an issue with differences between when sets of data from different houses are collected and/or time stamped. The are seeing 2ms differences between houses on event $1D Booster cycles and as much as 100ms on event $13 Booster cycles. John Diamond is spending time on this.

## PIP2IT RF Interlocks (HWR / SSR1)

### Oct. 30, 2018

Jim Galloway has been procuring parts and preparing to build one of the boards for the HWR interlocks. This is a lowpass filter on the forward/reflected power measurement (?). They are currently not working on the FPGA board. The RF interlocks for the HWR need to be ready to test in January 2019. The SSR1 RF interlock system still needs a budget and we are not cleared to purchase parts for this system.

### Nov. 6, 2018

In progress.

## Mu2e Delivery Ring BPM Upgrade

### Oct. 30, 2018

Mu2e needs to come up with money and help provide a specification of the new system. Niral reported that the current system is only able to record up to 7 turns of beam. Duane Voy has looked at the code and felt that they may be able to get up to 15 turns, but no more.

### Nov. 6, 2018

No change

## Current Delivery Ring BPM FE Code

### Oct. 30, 2018

Waiting. Peter mentioned that we were going to try to write code to build a closed orbit with the system we have now.

### Nov. 6, 2018

No change

## VxWorks 5.5 to 6.4 Conversion

### Oct. 30, 2018

Bobby Santucci has joined us and has started on this effort. He has begun inventorying the nodes that need the conversion. He has identified 100+ front-ends.

### Nov. 6, 2018

In progress

## PIP2IT Wire Scanner Negative-Bias Circuit

### Oct. 30, 2018

Andrea is working on this currently and needs to complete this project by January 2019.

### Nov. 6, 2018

In progress

## PIP2IT Intensity Monitors (Scrapers, Ring Pickups, Faraday Cup, etc.) 50 Ohm Modifications

### Oct. 30, 2018

Andrea is working on this currently and needs to complete this project by January 2019.

### Nov. 6, 2018

In progress

## Laser Profile Monitor

### Oct. 30, 2018

Vic was not available to comment, but Todd Johnson reported that he had provided Vic some CCD sensors. They plan to have more discussions soon.

### Nov. 6, 2018

Vic reported that they are putting together pieces of the laser profiler in the A0 laser lab and doing some testing. The laser hut is together, and they are needing to do some work on the design of the interlocks. PIP2IT is not expecting beam until early 2020.

## Linac Laser Notcher

### Oct. 30, 2018

Todd reported that they had made some timing changes before they reinstalled it and that has improved the readbacks of the laser position. Working on the new laser notcher LDRD.

Todd has received additional requests from NOVA to resurrect the old Tevatron hydro static level for their beam line. He has found some of the heads and some of the readback chassis. He is hoping to hand this all over to NOVA people. He has also received requests from Mu2e to provide temperature readbacks for their target.

### Nov. 6, 2018

Todd reported that nothing new has been done with the laser notcher this week, but it has only been running at half power since it was turned on after the shutdown. They have a crack in one of their stacker crystals. They are expecting to receive a replacement in the next week or two.

## Laser Working Group

### Nov. 6, 2018

Vic is currently organizing a laser working group. Their first meeting may take place next week. The email list for this group currently includes Vic Scarpine, Randy Thurman-Keup, James Santucci, Todd Johnson, David Johnson and Craig Drennan.

## Muon Schottky Tune Measurement

### Oct. 30, 2018

Brian and Vic will be trying to coordinate beam studies in the Muon beam line.

### Nov. 6, 2018

Vic is planning to give Brian Drendel and the rest of the Muon people a plan with regard to the beam requirements for doing the testing. 8GeV protons in the delivery ring are required.

## PIP2IT New RWCM / Toroid

### Oct. 30, 2018

This wall current monitor has not been decided on yet and specification will be needed before Brian can move forward with this.

### Nov. 6, 2018

Vic reported that a new wall current monitor is going to be designed. Brian Fellenz and Aisha will be involved in the design work.

## MI BLM Code Modifications & Studies

### Oct. 30, 2018

Randy will be looking to do turn-by-turn loss studies in the future.

### Nov. 6, 2018

No Change

## LBNF Hadron Monitor

### Oct. 30, 2018

Randy has been holding monthly meetings. There are no plans yet, to do prototyping or prototype testing here at Fermilab.

### Nov. 6, 2018

No Change

## MI-8 Multiwire Repairs (switch, cable swap)

### Oct. 30, 2018

Waiting for access.

### Nov. 6, 2018

These issues will be addressed during this week’s shutdown on Wednesday

## Muon PWC and Ion Chamber work.

### Oct. 30, 2018

All the PWCs and Ion chambers have been hooked up except for PWCs 020, 021, 025 and ion Chamber 025. These are waiting for access.

### Nov. 6, 2018

Waiting for access.

## NUMI Target Alignment BLMs

### Oct. 30, 2018

Gianni reported that the target alignment BLMs will be undergoing refurbishment and testing at TSB. Katsuya, from the Target Systems Department will be developing new testing procedures to be used before the BLMs are installed for future target alignments.

### Nov. 6, 2018

Waiting for access to retrieve the BLM detectors from the target hall. Then they will do a post-mortem on these detectors

## M-Test Fiber PWCs

### Oct. 30, 2018

Dan reported that old scintillator profile monitors in the M-Test line are being replaces with PWCs. There will be some time on Wednesday, November 7, to go down and finish the hookup of these PWCs. Dan is interfacing with Jason St. James.

### Nov. 6, 2018

These issues will be addressed during this week’s shutdown on Wednesday

## Meson Ion Chamber and Digitizer Upgrade and Meson Electronics Update. ($50k in FWP)

### Oct. 30, 2018

Craig related that Tom Kobilarcik had specified money for upgrades in the FWP budget document. Dan said that he had not heard of a need for new BLM electronics, but had gotten requests for new Ion Chambers and SEMs. All the new digitizers for these devices have already been built. These are calibrated and ready to go. Ion chambers will need to be assembled. Dan said he is just waiting for the go ahead from the M-Test / Switchyard people. When the money comes through, they can send out for the parts for the SEMs. We can get the parts in house, get the SEMS assembled and go out and install them.

### Nov. 6, 2018

No Change. Dan has not heard anything new for this.

## BNB Expand Target Cooling Instr. Rack

### Oct. 30, 2018

This is a long term item that is waiting. This will probably not be done this year.

### Nov. 6, 2018

No Change

## BNB Horn 5 Multiwire (money?)

### Oct. 30, 2018

This is waiting. Tom Kobilarcik has mentioned that he would like to change the design of the multiwire but has not come back with how he wants it.

### Nov. 6, 2018

No Change

## MI-8 Horn 4 Target Multiwire (cable termination)

### Oct. 30, 2018

Dan reported that they want to replace the 10 foot ribbon cable connection with discrete wires. Dan has gotten cost estimates for this. Chris Kelly was contacted for approval and will give Dan the cost code to go ahead and order the wire.

### Nov. 6, 2018

No Change

## UTA Multiwires (4 each)

### Oct. 30, 2018

Dan reported that there are 6 University of Texas multiwires that can be refurbished. These may cost $2k each to refurbish, plus the cost of new motors.

### Nov. 6, 2018

No Change

## Multiwire Work for Others

### Oct. 30, 2018

Gianni mentioned the multiwire slides (linear positioner) that Gianni and Matt Alvarez are designing for Japan

Two prototype multiwires for a university in Finland. The process of getting approvals through the DOE has been difficult.

### Nov. 6, 2018

Gianni is putting together an up-to-date cost estimate and then should be able to finalize everything. He believes that by the end of December they will be able to start ordering parts for the multiwires. Two to three months later, they should be able to start building the wire-plain assemblies.

## Ion Profile Monitors

### Nov. 6, 2018

Greg Saewert is currently working on a high voltage switch for the control grid of the IPM’s. Alex Lumpkin visited Argonne last week to talk with the folks who are doing the refurbishment, recoating of the micro-channel plates (MCPs). Alex reported that Argonne has an atomic layer deposition system with which they can recoat MCPs, up to 8 inch squares. He also found out that HEP Detector Development Group at Argonne has an MCP detector lab.

### Note on MCPs from Alex Lumpkin

Hi Randy and Carl,

  I visited ANL last week and in the course of a tour of their MCP lab with Junqi Xie (HEP), we discussed their microchannel plate (MCP) characterization options and also atomic layer deposition (ALD) done by Anil Mane (Energy Syst.). It is proposed that rejuvenating the FNAL MCPs that have too low gain with ALD techniques should work.

  Junqi asked for manufacturer (Hamamatsu or other), MCP dimensions, core or channel diameter, and thickness of plate. He has a MCP gain test setup for items up to 33 mm diam (?), but may be able to adjust to the larger FNAL samples. I resisted Junqi's initial comment to cut the MCP to size  for gain testing, but Randy has indicated a sacrificial test sample may be discussed.

  In a telecon with Anil on Monday, he noted he can coat up to 8" square MCPs in his system with either Aluminum oxide (low gain, 10^5) or Magnesium oxide (high gain, 10^6). The MCPs need to have some proper high resistance and not be shorted. In this case in another run, he could probably coat two FNAL ~3-4" size MCPs in one run.

    At the moment, it is proposed that the one test MCP sample be provided by FNAL with the gain pretest, coating, and final gain test  being done as an ANL courtesy in a collaborative effort in the next 2-3 weeks. (Junqi was to check with Bob Wagner.) If the test case is successful, FNAL would prepare a purchase order/contract to cover the ANL costs of more FNAL MCP rejuvenations. It is expected this option will be less than the purchase of new MCPs.

    Hopefully, I have presented the ANL perspective properly from my notes, and you can contact Junqi (630-252-1868) and Anil (630-252-7014) or by email for details and when to provide the MCP sample for the ALD test.

    Good luck to all,

Alex L.

## Switchyard Resonant BPM Repairs

### Nov. 6, 2018

Niral reported that he and John Seraphin will be working to repair a noisy resonant BPM, HP100. He will be getting this job on the worklist and will be waiting for an access.

## Cabling up the Cryo-Modules for LCLS

### Nov. 6, 2018

John Seraphin had reported that a lot of work was being done to cable up the new cryo-modules for LCLS out at CMTF.

# INACTIVE PROJECTS

## Booster CHG-0 Bergoz DCCT.

### Oct. 30, 2018

Craig reported that Mary Convery told him that the AIP for this device will not be going through this year.

## Booster Damper AIP (Transverse / Longitudinal)

### Oct. 30, 2018

Craig reported that Mary Convery told him that the AIP for this device will not be going through this year.

## Recycler BPM Data Upgrade

### Oct. 30, 2018

Waiting.

## Recycler BPM Calibrations

### Oct. 30, 2018

Waiting. Could not recall what the issue here is.

## Switchyard Resonant BPM Intensity Calibration

### Oct. 30, 2018

Waiting.

## NUMI Button BPM FE Code

### Oct. 30, 2018

Waiting. There needs to be new hardware, firmware, processors and application specifications for this effort. NUMI has hopes to use these BPM in their machine protection at some point.

### Nov. 6, 2018

No change

## 8 GeV BPM FE Code Upgrade

### Oct. 30, 2018

Currently waiting on a specification and then people to work on it.

## 8 GeV BLM Log Amp Boards

### Oct. 30, 2018

Andrea will be working on this later in the year, after the PIP2IT run is completed.

## MI-62 Electron Beam Profiler

### Oct. 30, 2018

Waiting

## FAST Bunch Length System Studies

### Oct. 30, 2018

Waiting for machine approval to do the studies.

## MTA Refurbishment (2 BLMs, 9 multiwires)

### Oct. 30, 2018

Re-establishing MTA as a user’s radiation testing facility is still just a rumor as far as we know.

## Upgrade Gloor Multiwires to Gloor II (8 each)

### Oct. 30, 2018

This is not an active project but is on the back burner.

# COMPLETED PROJECTS

## MI12A Dehumidifier Sensors

### Oct. 30, 2018

Dan reported that this work is now complete. Munter dehumidifiers in the upstream of MI-12

## MI-12B Target Sump Water Level

### Oct. 30, 2018

Dan reported that this has been installed.